clocke by N' 2/15/17

#### **CETIFICATION**

SDG No:

MC49242

Humacao, PR

Laboratory:

Accutest, Massachusetts

Site:

BMS, Building 5 Area, PR

Matrix:

Groundwater

**SUMMARY:** 

Groundwater samples (Table 1) were collected on the BMSMC facility – Building 5 Area. The BMSMC facility is located in Humacao, PR. Samples were collected December 19 - 21, 2016 and were analyzed in Accutest Laboratory of Marlborough, Massachusetts that reported the data under SDG No.: MC49242. Results were validated using the following quality control criteria of the methods employed (MADEP VPH and MAPED EPH, Massachusets Department of Environmental Protection, 2004) and the latest validation guidelines (July, 2015) of the EPA Hazardous Waste Support Section. The analyses performed are shown in Table 1. Individual data review worksheets are enclosed for each target analyte group. The data sample organic data samples summary form shows for analytes results that were qualified.

In summary the results are valid and can be used for decision taking purposes.

Table 1. Samples analyzed and analysis performed

SAMPLE ID	SAMPLE DESCRIPTION	MATRIX	ANALYSIS PERFORMED
MC49242-1	FB121916	AQ - Field Blank Water	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49242-2	MW-23	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49242-3	MW-3	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49242-4	MW-15	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49242-4D	MW-15 MSD	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49242-4S	MW-15 MS	Groundwater	Volatiles TPHC Ranges
	v		Extractable TPHC Ranges
MC49242-5	MW-17	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49242-6	MW-17	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49242-7	FB122016	AQ - Field Blank Water	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49242-8	EB122116	AQ - Equipment Blank	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49242-9	MW-18	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49242-10	BR-1	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges
MC49242-11	BR-1 DUP	Groundwater	Volatiles TPHC Ranges
			Extractable TPHC Ranges

SAMPLE ID	SAMPLE DESCRIPTION	MATRIX	ANALYSIS PERFORMED
MC49242-12	BR-2	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49242-13	MW-17 DUP	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges

Reviewer Name:

Rafael Infante

Chemist License 1888

Signature:

Date:

February 9, 2017

Rafael Internal Color ENCIN PO1617176

# Report of Analysis

By

AF

Page 1 of 1

Client Sample ID: FB121916

Lab Sample ID:

MC49242-1

File ID

AQ - Field Blank Water

Date Sampled: 12/19/16 Date Received: 12/22/16

Matrix: Method:

MADEP VPH REV 1.1

DF

1

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

12/28/16

Prep Batch n/a

Prep Date

Limits

n/a

Analytical Batch GWX3888

Run #1 Run #2

Purge Volume

Surrogate Recoveries

WX78490.D

Run #1 Run #2

CAS No.

5.0 ml

Volatile TPHC Ranges

CAS No. Compound Result RL MDL Units Q

> C5- C8 Aliphatics (Unadj.) ND 50 8.8 ug/I C9- C12 Aliphatics (Unadj.) 11.3 50 JB 8.0 ug/l ug/I C9- C10 Aromatics (Unadj.) 13.0 50 9.7 JB

C5- C8 Aliphatics ND 50 8.8 ug/I C9- C12 Aliphatics ND 50 8.0 ug/l

2,3,4-Trifluorotoluene 79% 70-130%

2.3.4-Trifluorotoluene 70-130% 93%

Run#1

Run#2



ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range



### Report of Analysis

Page 1 of 1

Client Sample ID: FB121916

Lab Sample ID: MC49242-1

Matrix:

AO - Field Blank Water

Date Sampled: 12/19/16

Method:

MADEP EPH REV 1.1 SW846 3510C

Date Received: 12/22/16

Project:

BMSMC, Building 5 Area, Puerto Rico

Percent Solids: n/a

Run #1 Run #2

File ID DF DE16645.D 1

Analyzed 01/04/17

Ву AP

RL

100

Prep Date Prep Batch 12/30/16 OP49338

Analytical Batch **GDE926** 

580-13-2

Initial Volume

Final Volume

Run #1 Run #2

960 ml

2.0 ml

**Extractable TPHC Ranges** 

CAS No. Compound Result

C9-C18 Aliphatics

C19-C36 Aliphatics

C11-C22 Aromatics

2-Bromonaphthalene

C11-C22 Aromatics (Unadj.) 38.3 100 ND

ND

38.3

82%

30 17 100 100 28

30

MDL

ug/l ug/I ug/I

Units

ug/l

Q

JB

JB

CAS No. Surrogate Recoveries Run#1 Run#2 Limits

84-15-1 o-Terphenyl 79% 321-60-8 2-Fluorobiphenyl 80% 3386-33-2 1-Chlorooctadecane 40%

40-140% 40-140% 40-140%

40-140%

tafuel Infan Méndez LIC. # 188

ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



# Report of Analysis

Ву

ΑF

Page 1 of 1

Client Sample ID: MW-23

Lab Sample ID: MC49242-2

Matrix:

AO - Ground Water

DF

1

Date Sampled: 12/19/16 Date Received: 12/22/16

Method:

MADEP VPH REV 1.1

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

12/27/16

Prep Batch

n/a

JB

ΙB

Prep Date

n/a

**Analytical Batch** GWX3888

Run #1 Run #2

Purge Volume

WX78487.D

Run #1 Run #2 5.0 ml

File ID

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	

C9- C12 Aliphatics (Unadj.) 10.5 50 8.0 ug/l C9- C10 Aromatics (Unadj.) 50 9.7 13.7 ug/l C5- C8 Aliphatics ND 50 8.8 ug/l C9- C12 Aliphatics ND 50 8.0 ug/l

CAS No. Surrogate Recoveries Run#1 Run#2 Limits 2,3,4-Trifluorotoluene 81% 70-130%

2,3,4-Trifluorotoluene 95% 70-130%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

AP

Page 1 of 1

Client Sample ID: MW-23 Lab Sample ID:

MC49242-2

Matrix:

AQ - Ground Water

1

MADEP EPH REV 1.1 SW846 3510C

Date Received: 12/22/16

Date Sampled: 12/19/16

Method: Project:

BMSMC, Building 5 Area, Puerto Rico

Percent Solids: n/a

Run #1

DF Analyzed Ву

01/05/17

Prep Batch OP49338

Prep Date

12/30/16

**Analytical Batch GDE926** 

Run #2

Initial Volume 930 ml

File ID

DE16662.D

Final Volume 2.0 ml

Run #1 Run #2

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	45.4	110	31	ug/l	JB
	C9-C18 Aliphatics	20.5	110	18	ug/l	j
	C19-C36 Aliphatics	37.0	110	29	ug/l	J
	C11-C22 Aromatics	45.4	110	31	ug/l	1B

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	69%		40-140%
321-60-8	2-Fluorobiphenyl	71%		40-140%
3386-33-2	1-Chlorooctadecane	41%		40-140%
580-13-2	2-Bromonaphthalene	72%		40-140%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

Page 1 of 1

Client Sample ID: MW-3

Lab Sample ID:

MC49242-3

Matrix:

Method:

Project:

AQ - Ground Water

MADEP VPH REV 1.1

BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/19/16 Date Received: 12/22/16

Percent Solids: n/a

Ву Prep Date **Analytical Batch** File ID DF Analyzed Prep Batch Run #1 WX78480.D GWX3888 1 12/27/16 AF n/a n/a Run #2

Purge Volume

5.0 ml

Run #1 Run #2

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	63.9	50	8.0	ug/l	В
	C9- C10 Aromatics (Unadj.)	44.4	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	18.5	50	8.0	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	79%		70-130%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Page 1 of 1

### SGS Accutest LabLink@170912 10:55 11-Jan-2017

# Report of Analysis

Client Sample ID: MW-3

Lab Sample ID:

MC49242-3

Matrix: Method:

Project:

AQ - Ground Water

MADEP EPH REV 1.1 SW846 3510C BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/19/16

Date Received: 12/22/16

Percent Solids: n/a

Analytical Batch File ID DF Analyzed Ву Prep Date Prep Batch Run #1 DE16663.D 12/30/16 OP49338 **GDE926** 1 01/05/17 AP Run #2

Initial Volume Final Volume Run #1 990 ml 2.0 ml Run #2

### **Extractable TPHC Ranges**

Compound	Result	RL	MDL	Units	Q
C11-C22 Aromatics (Unadj.)	106	100	29	ug/l	В
	21.7 ND	100 100	- •	•	J
C11-C22 Aromatics	101	100	29	ug/l	В
	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C19-C36 Aliphatics	C11-C22 Aromatics (Unadj.) 106 C9-C18 Aliphatics 21.7 C19-C36 Aliphatics ND	C11-C22 Aromatics (Unadj.) 106 100 C9-C18 Aliphatics 21.7 100 C19-C36 Aliphatics ND 100	C11-C22 Aromatics (Unadj.) 106 100 29 C9-C18 Aliphatics 21.7 100 17 C19-C36 Aliphatics ND 100 27	C11-C22 Aromatics (Unadj.) 106 100 29 ug/l C9-C18 Aliphatics 21.7 100 17 ug/l C19-C36 Aliphatics ND 100 27 ug/l

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	73%		40-140%
321-60-8	2-Fluorobiphenyl	76%		40-140%
3386-33-2	1-Chlorooctadecane	51%		40-140%
580-13-2	2-Bromonaphthalene	78%		40-140%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

Ву

AF

Prep Date

n/a

Page 1 of 1

Client Sample ID: MW-15

Lab Sample ID:

MC49242-4

Matrix: Method:

Project:

AQ - Ground Water

MADEP VPH REV 1.1

DF

1

BMSMC, Building 5 Area, Puerto Rico

Analyzed

12/27/16

Date Sampled: 12/20/16

n/a

Date Received: 12/22/16

Percent Solids: n/a

Prep Batch **Analytical Batch** GWX3888

Run #1 Run #2

Purge Volume

WX78471.D

File ID

Run #1 5.0 ml

Run #2

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	47.5	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	154	50	8.0	ug/l	
	C9- C10 Aromatics (Unadj.)	90.0	50	9.7	ug/l	В
	C5- C8 Aliphatics	32.7	50	8.8	ug/l	J
	C9- C12 Aliphatics	63.3	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	79% 95%		70-130% 70-130%





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



# Report of Analysis

Ву

AP

Page 1 of 1

Client Sample ID: Lab Sample ID:

MW-15 MC49242-4

AQ - Ground Water

DF

Date Sampled: 12/20/16 Date Received: 12/22/16

Matrix: Method:

MADEP EPH REV 1.1 SW846 3510C

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

01/05/17

Analytical Batch Prep Batch

Run #1 Run #2

Initial Volume

File ID

DE16664.D

Final Volume

OP49338 12/30/16

Prep Date

**GDE926** 

Run #1

990 ml 2.0 ml

Run #2

#### **Extractable TPHC Ranges**

Compound	Result	RL	MDL	Units	Q
C11-C22 Aromatics (Unadj.)	82.5	100	29	ug/l	JB
C9-C18 Aliphatics	21.0	100	17	ug/l	J
C19-C36 Aliphatics	ND	100	27	ug/I	
C11-C22 Aromatics	80.0	100	29	ug/l	JB
	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C19-C36 Aliphatics	C11-C22 Aromatics (Unadj.) 82.5 C9-C18 Aliphatics 21.0 C19-C36 Aliphatics ND	C11-C22 Aromatics (Unadj.) 82.5 100 C9-C18 Aliphatics 21.0 100 C19-C36 Aliphatics ND 100	C11-C22 Aromatics (Unadj.) 82.5 100 29 C9-C18 Aliphatics 21.0 100 17 C19-C36 Aliphatics ND 100 27	C11-C22 Aromatics (Unadj.) 82.5 100 29 ug/l C9-C18 Aliphatics 21.0 100 17 ug/l C19-C36 Aliphatics ND 100 27 ug/l

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	61%		40-140%
321-60-8	2-Fluorobiphenyl	79%		40-140%
3386-33-2	1-Chlorooctadecane	43%		40-140%
580-13-2	2-Bromonaphthalene	81%		40-140%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

Page 1 of 1

Client Sample ID: MW-17 Lab Sample ID:

MC49242-5

Matrix:

Method:

Project:

AQ - Ground Water

MADEP VPH REV 1.1

BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/20/16

Date Received: 12/22/16

Percent Solids: n/a

	File ID	DF	Analyzed	Ву	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78482.D	1	12/27/16	AF	n/a ¯	n/a	GWX3888
Run #2							

Purge Volume

Run #1 5.0 ml

Run #2

### Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	20.2	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	126	50	8.0	ug/l	В
	C9- C10 Aromatics (Unadj.)	66.9	50	9.7	ug/l	В
	C5- C8 Aliphatics	18.8	50	8.8	ug/l	J
	C9- C12 Aliphatics	57.6	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene 2,3,4-Trifluorotoluene	81% 96%		70-130% 70-130%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

Ву

ΑP

Page 1 of 1

Client Sample ID: Lab Sample ID:

MW-17 MC49242-5

Matrix: Method: AQ - Ground Water

MADEP EPH REV 1.1 SW846 3510C

Date Sampled: 12/20/16 Date Received: 12/22/16

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Run #1 Run #2

File ID DE16649.D Analyzed 01/04/17

Prep Date 12/30/16

Prep Batch OP49338

**Analytical Batch GDE926** 

Initial Volume Final Volume 990 ml

2.0 ml

DF

1

Run #1 Run #2

### **Extractable TPHC Ranges**

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	156	100	29	ug/l	В
	C9-C18 Aliphatics	68.6	100	17	ug/l	j
	C19-C36 Aliphatics	28.9	100	27	ug/l	J
	C11-C22 Aromatics	156	100	29	ug/l	В

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	80%		40-140%
321-60-8	2-Fluorobiphenyl	81%		40-140%
3386-33-2	1-Chlorooctadecane	46%		40-140%
580-13-2	2-Bromonaphthalene	83%		40-140%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

Page 1 of 1

Client Sample ID: Lab Sample ID:

MW-14 MC49242-6

Matrix: Method:

Project:

AQ - Ground Water

MADEP VPH REV 1.1

BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/20/16

Date Received: 12/22/16

Percent Solids: n/a

File ID DF Prep Date **Analytical Batch** Analyzed By Prep Batch WX78484.D 12/27/16 AF GWX3888 1 n/a n/a

Run #1 Run #2

Purge Volume

2,3,4-Trifluorotoluene

Run #1 Run #2

5.0 ml

### Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	12.4	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	15.1	50	9.7	ug/l	JВ
	C5- C8 Aliphatics	ND	50	8.8	ug/l	_
	C9- C12 Aliphatics	ND	50	8.0	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
	2,3,4-Trifluorotoluene	81%		70-1	30%	1

95%





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

70-130%

B = Indicates analyte found in associated method blank

# Report of Analysis

Page 1 of 1

Client Sample ID: Lab Sample ID:

MW-14 MC49242-6

Matrix:

AQ - Ground Water

Date Received: 12/22/16

Date Sampled: 12/20/16

Method: Project:

MADEP EPH REV 1.1 SW846 3510C BMSMC, Building 5 Area, Puerto Rico

Percent Solids: n/a

Run #1

File ID DF

1

Analyzed Ву 01/05/17 ΑP Prep Date 12/30/16

Prep Batch OP49338

**Analytical Batch** GDE926

Run #2

Initial Volume 960 ml

DE16665.D

Final Volume 2.0 ml

Run #1 Run #2

### **Extractable TPHC Ranges**

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	37.0	100	30	ug/l	JB
	C9-C18 Aliphatics	17.7	100	17	ug/l	J
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	37.0	100	30	ug/l	JB
				2.0		

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	69%		40-140%
321-60-8	2-Fluorobiphenyl	72%		40-140%
3386-33-2	1-Chlorooctadecane	48%		40-140%
580-13-2	2-Bromonaphthalene	74%		40-140%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

**E** = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

### Report of Analysis

Page 1 of 1

Client Sample ID: FB122016 Lab Sample ID:

MC49242-7

AQ - Field Blank Water

Matrix: Method:

Project:

MADEP VPH REV 1.1 BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/20/16

Date Received: 12/22/16

Percent Solids: n/a

File ID DF Analyzed By Prep Date Prep Batch **Analytical Batch** Run #1 WX78488.D 12/27/16 AF GWX3888 1 n/a n/a

Run #2

Purge Volume

5.0 ml

Run #1

Run #2

Volatile TPHC Ranges

CAS No. Compound RL MDL Result Units Q C5- C8 Aliphatics (Unadj.) ND 50 8.8 ug/l C9- C12 Aliphatics (Unadj.) 9.2 50 8.0 ug/l JB C9- C10 Aromatics (Unadj.) 13.0 50 9.7 ug/l JB C5- C8 Aliphatics ND 50 8.8 ug/l C9- C12 Aliphatics ND 50 8.0 ug/l

CAS No. Surrogate Recoveries Run#1 Run#2 Limits 2,3,4-Trifluorotoluene 81% 70-130% 2,3,4-Trifluorotoluene 94% 70-130%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



# Report of Analysis

Ву

ΑP

Page 1 of 1

Client Sample ID: FB122016 Lab Sample ID:

MC49242-7

AQ - Field Blank Water

DF

1

Date Sampled: 12/20/16

Date Received: 12/22/16

Matrix: Method:

MADEP EPH REV 1.1 SW846 3510C

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

01/04/17

**Analytical Batch** 

Run #1 Run #2

DE16652.D

Prep Date 12/30/16

40-140%

Prep Batch OP49338

**GDE926** 

Initial Volume 960 ml

File ID

Final Volume 2.0 ml

Run #1 Run #2

580-13-2

2-Bromonaphthalene

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q

C11-C22 Aromatics (Unadj.)	41.6	100	30	ug/l	JB
C9-C18 Aliphatics	ND	100	17	ug/l	
C19-C36 Aliphatics	ND	100	28	ug/l	
C11-C22 Aromatics	41.6	100	30	ug/l	JB

86%

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	81%		40-140%
321-60-8	2-Fluorobiphenyl	84%		40-140%
3386-33-2	1-Chlorooctadecane	44%		40.140%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

Page 1 of 1

Client Sample ID: Lab Sample ID:

EB122116 MC49242-8

AQ - Equipment Blank

Matrix: Method:

MADEP VPH REV 1.1

Project:

BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/21/16

12/22/16

Percent Solids: n/a

Date Received:

Run #1 Run #2 File ID DF WX78489.D 1

Analyzed 12/28/16

By AF Prep Date n/a

Prep Batch n/a

**Analytical Batch** GWX3888

Purge Volume

Run #1 Run #2 5.0 ml

**Volatile TPHC Ranges** 

CAS No. Compound Result RL MDL Units Q C5- C8 Aliphatics (Unadj.) ND 8.8 50 ug/l C9- C12 Aliphatics (Unadj.) 10.5 50 8.0 JB ug/l C9- C10 Aromatics (Unadj.) 12.8 50 9.7 ug/l JB C5- C8 Aliphatics ND 50 8.8 ug/l ND 50 8.0 ug/l

Run#1

Run#2

C9- C12 Aliphatics CAS No. Surrogate Recoveries

> 2,3,4-Trifluorotoluene 81% 2,3,4-Trifluorotoluene 94%

70-130% 70-130%

Limits



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

Page 1 of 1

Client Sample ID: Lab Sample ID:

EB122116 MC49242-8

Matrix: Method:

Project:

AQ - Equipment Blank

MADEP EPH REV 1.1 SW846 3510C BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/21/16

Date Received: 12/22/16

Percent Solids: n/a

File ID DF Prep Batch **Analytical Batch** Analyzed By Prep Date Run #1 DE16666.D 1 01/05/17 AP 12/30/16 OP49338 **GDE926** 

Run #2

Initial Volume

Final Volume

940 ml

2.0 ml

Run #1 Run #2

**Extractable TPHC Ranges** 

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	39.4	110	30	ug/l	JB
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	ND	110	29	ug/l	
	C11-C22 Aromatics	39.4	110	30	ug/l	JB

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	84%		40-140%
321-60-8	2-Fluorobiphenyl	79%		40-140%
3386-33-2	1-Chlorooctadecane	58%		40-140%
580-13-2	2-Bromonaphthalene	82%		40-140%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound



**ACCUTEST** 

# Report of Analysis

Ву

AF

Page 1 of 1

Client Sample ID: MW-18 Lab Sample ID:

MC49242-9

Date Sampled: 12/20/16

n/a

JB JB

Prep Date

n/a

Matrix:

AQ - Ground Water MADEP VPH REV 1.1

DF

1

Date Received: 12/22/16

Method: Project:

BMSMC, Building 5 Area, Puerto Rico

Percent Solids: n/a

Analyzed

12/27/16

Prep Batch **Analytical Batch** 

GWX3888

Run #1

Run #2

Purge Volume

WX78481.D

Run #1

5.0 ml

File ID

Run #2

### Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l
	C9- C12 Aliphatics (Unadj.)	12.1	50	8.0	ug/l
	C9- C10 Aromatics (Unadj.)	12.0	50	9.7	ug/l
	C5- C8 Aliphatics	ND	50	8.8	ug/l
	C9- C12 Aliphatics	ND	50	8.0	ug/l
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its
	2,3,4-Trifluorotoluene	80%		70-1	30%
	2,3,4-Trifluorotoluene	93%		70-1	30%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

Ву

AP

Prep Date

12/30/16

Page 1 of 1

Client Sample ID: Lab Sample ID:

MW-18 MC49242-9

Matrix: Method: AQ - Ground Water

MADEP EPH REV 1.1 SW846 3510C

Date Sampled: 12/20/16 Date Received:

Q

JΒ J

JB

12/22/16

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

01/05/17

Prep Batch **OP49338** 

**Analytical Batch GDE926** 

Run #1 Run #2

Initial Volume Run #1 970 ml

File ID

DE16667.D

Final Volume

2.0 ml

DF

1

Run #2

#### Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	
	C11-C22 Aromatics (Unadj.)	48.6	100	30	ug/l	
	C9-C18 Aliphatics	17.8	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	48.6	100	30	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
84-15-1	o-Terphenyl	78%		40-1	40%	
321-60-8	2-Fluorobiphenyl	83%		40-1	40%	
3386-33-2	1-Chlorooctadecane	48%		40-1	40%	
580-13-2	2-Bromonaphthalene	85%		40-1	40%	



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

Page 1 of 1

Client Sample ID: BR-1

Lab Sample ID:

MC49242-10

Matrix:

Project:

AQ - Ground Water

Method:

MADEP VPH REV 1.1

BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/21/16

Date Received: 12/22/16

Percent Solids: n/a

	File ID	DF	Analyzed	Ву	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78483.D	1	12/27/16	AF	n/a	n/a	GWX3888
l							

Run #2

Purge Volume

5.0 ml

Run #1

Run #2

#### Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	32.8	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	34.0	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	20.1	50	9.7	ug/l	JB
	C5- C8 Aliphatics	23.2	50	8.8	ug/l	j
	C9- C12 Aliphatics	13.9	50	8.0	ug/l	Ĵ
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
	2,3,4-Trifluorotoluene	80%		70-1	30%	
	2.3.4-Trifluorotoluene	93%			30%	



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

By

AP

Page 1 of 1

Client Sample ID:

Lab Sample ID:

MC49242-10

Matrix: Method:

AQ - Ground Water

DF

1

MADEP EPH REV 1.1 SW846 3510C

12/30/16

40-140%

Date Sampled: 12/21/16 Date Received: 12/22/16

Percent Solids: n/a

Q

JB

JB

Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

01/05/17

Prep Date

**Analytical Batch** Prep Batch OP49338 **GDE926** 

Run #1 Run #2

Initial Volume

Final Volume

960 ml

File ID

DE16655.D

2.0 ml

2-Bromonaphthalene

Run #1 Run #2

580-13-2

#### **Extractable TPHC Ranges**

CAS No.	Compound	Result	RL	MDL	Units	
	C11-C22 Aromatics (Unadj.)	73.6	100	30	ug/l	
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	73.6	100	30	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
84-15-1	o-Terphenyl	85%		40-1	40%	
321-60-8	2-Fluorobiphenyl	82%		40-1	40%	
3386-33-2	1-Chlorooctadecane	40%		40-1	40%	

84%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

By

AF

Page 1 of 1

Client Sample ID: Lab Sample ID:

BR-1 DUP MC49242-11

Prep Date

n/a

Date Sampled: 12/21/16

Matrix:

AQ - Ground Water

Date Received: 12/22/16

Method:

MADEP VPH REV 1.1

DF

1

Percent Solids: n/a

n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

12/27/16

Prep Batch Analytical Batch

**GWX3888** 

Run #1

Run #2

Purge Volume

WX78486.D

File ID

5.0 ml

Run #1 Run #2

Volatile TPHC Ranges

CAS No. Compound RL MDL Result Units Q C5- C8 Aliphatics (Unadj.) 32.9 50 8.8 ug/l J C9- C12 Aliphatics (Unadj.) 32.2 50 8.0 ug/l JB

C9- C10 Aromatics (Unadj.) 21.5 50 9.7 ug/l JB C5- C8 Aliphatics 23.4 50 8.8 ug/l J C9- C12 Aliphatics 9.9 50 8.0 ug/l J

CAS No. Surrogate Recoveries Run#1 Run# 2 Limits

2,3,4-Trifluorotoluene 80% 70-130% 2,3,4-Trifluorotoluene 95% 70-130%



ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank N = Indicates presumptive evidence of a compound



# Report of Analysis

Page 1 of 1

Client Sample ID: **BR-1 DUP** Lab Sample ID:

MC49242-11

Date Sampled: Date Received: 12/22/16

12/21/16

Matrix: Method:

AQ - Ground Water MADEP EPH REV 1.1 SW846 3510C

Percent Solids: n/a

Project:

BMSMC, Building 5 Area, Puerto Rico

Prep Batch **Analytical Batch** 

File ID DF Analyzed By Prep Date Run #1 DE16656.D 1 01/05/17 ΑP 12/30/16 OP49338 **GDE926** Run #2 a DE16668.D 1 01/05/17 AP 12/30/16 **OP49338 GDE926** 

	Initial Volume	Final Volume
Run #1	960 ml	2.0 ml
Run #2	960 ml	2.0 ml

### **Extractable TPHC Ranges**

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C19-C36 Aliphatics C11-C22 Aromatics	67.3 ND ND 67.3	100 100 100 100	30 17 28 30	ug/l ug/l ug/l ug/l	JB JB
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limi	its	
84-15-1 321-60-8 3386-33-2 580-13-2	o-Terphenyl 2-Fluorobiphenyl 1-Chlorooctadecane 2-Bromonaphthalene	74% 87% 30% <sup>b</sup> 88%	65% 75% 29% <sup>b</sup> 77%	40-1 40-1 40-1 40-1	40% 40%	



- (a) Confirmation run.
- (b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.

ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

# Report of Analysis

Page 1 of 1

Client Sample ID: BR-2

Lab Sample ID:

MC49242-12

Matrix: Method:

Project:

AQ - Ground Water

MADEP VPH REV 1.1

BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/21/16

Date Received: 12/22/16 Percent Solids: n/a

Run #1	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
	WX78485.D	1	12/27/16	AF	n/a	n/a	GWX3888
Run #2							

Purge Volume Run #1 5.0 ml

Run #2

#### Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	18.8	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	104	50	8.0	ug/l	В
	C9- C10 Aromatics (Unadj.)	64.5	50	9.7	ug/l	В
	C5- C8 Aliphatics	16.6	50	8.8	ug/l	J
	C9- C12 Aliphatics	38.5	50	8.0	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	81%		70-130%
	2,3,4-Trifluorotoluene	95%		70-130%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

By

AP

12/30/16

Page 1 of 1

Client Sample ID: BR-2

File ID

DE16669.D

Lab Sample ID:

MC49242-12

Matrix:

AQ - Ground Water

DF

1

MADEP EPH REV 1.1 SW846 3510C

Date Sampled: 12/21/16

Date Received: 12/22/16

Percent Solids: n/a

OP49338

Method: Project:

BMSMC, Building 5 Area, Puerto Rico

Analyzed

01/05/17

Analytical Batch Prep Date Prep Batch

**GDE926** 

Run #1

Run #2

Initial Volume Final Volume

Run #1

940 ml 2.0 ml

Run #2

#### **Extractable TPHC Ranges**

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	95.9	110	30	ug/l	JB
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	ND	110	29	ug/l	
	C11-C22 Aromatics	95.9	110	30	ug/l	JB

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1 321-60-8	o-Terphenyl 2-Fluorobiphenyl	81% 75%		40-140% 40-140%
3386-33-2	1-Chlorooctadecane	48%		40-140%
580-13-2	2-Bromonaphthalene	77%		40-140%



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

# Report of Analysis

Page 1 of 1

Client Sample ID: MW-17 DUP Lab Sample ID:

MC49242-13

Matrix:

AQ - Ground Water

MADEP VPH REV 1.1

Run#2

Date Sampled: 12/20/16 Date Received: 12/22/16

Percent Solids: n/a

Method: Project:

BMSMC, Building 5 Area, Puerto Rico

File ID Run #1 WX78479.D

DF Analyzed 12/27/16 1

By AF Prep Date n/a

Prep Batch n/a

**Analytical Batch** GWX3888

Run #2

Purge Volume

Run #1 Run #2

5.0 ml

#### **Volatile TPHC Ranges**

Compound	Result	RL	MDL	Units	Q
C5- C8 Aliphatics (Unadj.)	18.4	50	8.8	ug/l	J
C9- C12 Aliphatics (Unadj.)	130	50	8.0	ug/l	В
C9- C10 Aromatics (Unadj.)	69.7	50	9.7	ug/l	В
C5- C8 Aliphatics	17.5	50	8.8	ug/l	J
C9- C12 Aliphatics	58.2	50	8.0	ug/l	
	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics	C5- C8 Aliphatics (Unadj.) 18.4 C9- C12 Aliphatics (Unadj.) 130 C9- C10 Aromatics (Unadj.) 69.7 C5- C8 Aliphatics 17.5	C5- C8 Aliphatics (Unadj.) 18.4 50 C9- C12 Aliphatics (Unadj.) 130 50 C9- C10 Aromatics (Unadj.) 69.7 50 C5- C8 Aliphatics 17.5 50	C5- C8 Aliphatics (Unadj.) 18.4 50 8.8 C9- C12 Aliphatics (Unadj.) 130 50 8.0 C9- C10 Aromatics (Unadj.) 69.7 50 9.7 C5- C8 Aliphatics 17.5 50 8.8	C5- C8 Aliphatics (Unadj.) 18.4 50 8.8 ug/l C9- C12 Aliphatics (Unadj.) 130 50 8.0 ug/l C9- C10 Aromatics (Unadj.) 69.7 50 9.7 ug/l C5- C8 Aliphatics 17.5 50 8.8 ug/l

CAS No.	Surrogate Recoveries	Run# 1

2,3,4-Trifluorotoluene 80% 2,3,4-Trifluorotoluene 93%

70-130% 70-130%

Limits





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



# Report of Analysis

Page 1 of 1

Client Sample ID:	MW-17 DUP
Lab Sample ID:	MC49242-13
Lab Sample ID: Matrix:	AQ - Ground W

Vater

Date Sampled: 12/20/16 Date Received: 12/22/16

Method: Project:

MADEP EPH REV 1.1 SW846 3510C BMSMC, Building 5 Area, Puerto Rico

Percent Solids: n/a

	Initial Volume	Final Volume
Run #1	920 ml	2.0 ml
Run #2	920 ml	2.0 ml

### **Extractable TPHC Ranges**

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C19-C36 Aliphatics C11-C22 Aromatics	51.1 ND ND 51.1	110 110 110 110	31 18 29 31	ug/l ug/l ug/l ug/l	JB JB
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
84-15-1 321-60-8 3386-33-2 580-13-2	o-Terphenyl 2-Fluorobiphenyl 1-Chlorooctadecane 2-Bromonaphthalene	67% 91% 26% <sup>b</sup> 92%	60% 79% 34% <sup>b</sup> 82%	40-1 40-1 40-1 40-1	40% 40%	



ND = Not detected RL = Reporting Limit MDL = Method Detection Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

<sup>(</sup>a) Confirmation run.

<sup>(</sup>b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.

# Matrix Spike/Matrix Spike Duplicate Summary

Page 1 of 1

Job Number: MC49242

AMANYWP Anderson Mulholland and Assoc. Account:

Project:

BMSMC, Building 5 Area, Puerto Rico

MC49242-4MSD WX78473.D 1 12/27/16 AF n/a n/a GWX3888 MC49242-4 WX78471.D 1 12/27/16 AF n/a n/a GWX3888	Sample MC49242-4MS MC49242-4MSD MC49242-4	File ID WX78472.D WX78473.D WX78471.D	DF 1 1	Analyzed 12/27/16 12/27/16 12/27/16	By AF AF AF	Prep Date n/a n/a n/a		Analytical Batch GWX3888 GWX3888 GWX3888
---	--	--	--------------	--	----------------------	--------------------------------	--	---

The QC reported here applies to the following samples:

Method: MADEP VPH REV 1.1

MC49242-1, MC49242-2, MC49242-3, MC49242-4, MC49242-5, MC49242-6, MC49242-7, MC49242-8, MC49242-9, MC49242-10, MC49242-11, MC49242-12, MC49242-13

CAS No.	Compound	MC492 ug/l	42-4 Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.)	47.5 154 90.0	J B	300 450 150	467 662 206	140* <sup>a</sup> 127 77	300 450 150	475 653 198	143* a 125 72	2 1 4	70-130/25 70-130/25 70-130/25

CAS No.	Surrogate Recoveries	MS	MSD	MC49242-4	Limits	
	2,3,4-Trifluorotoluene	79%	81%	79%	70-130%	
	2,3,4-Trifluorotoluene	96%	99%	95%	70-130%	

(a) Outside control limits due to possible matrix interference.



<sup>\* =</sup> Outside of Control Limits.

321-60-8

3386-33-2

580-13-2

# Matrix Spike/Matrix Spike Duplicate Summary

Job Number:

2-Fluorobiphenyl

1-Chlorooctadecane

2-Bromonaphthalene

MC49242

Account: AMANYWP Anderson Mulholland and Assoc.

Project: BMSMC, Building 5 Area, Puerto Rico

Sample OP49338-MS OP49338-MSD MC49242-4	File ID DE16661.D DE16644.D DE16664.D	DF 1 1	Analyzed 01/05/17 01/04/17 01/05/17	By AP AP AP	Prep Date 12/30/16 12/30/16 12/30/16	Prep Batch OP49338 OP49338 OP49338	Analytical Batch GDE926 GDE926 GDE926

The QC reported here applies to the following samples:

114%

43%

116%

Method: MADEP EPH REV 1.1

MC49242-1, MC49242-2, MC49242-3, MC49242-4, MC49242-5, MC49242-6, MC49242-7, MC49242-8, MC49242-9, MC49242-10, MC49242-11, MC49242-12, MC49242-13

79%

43%

81%

40-140%

40-140%

40-140%

CAS No.	Compound	MC49242 ug/l (		Spike ug/l	MS ug/		MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD	
	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C19-C36 Aliphatics	82.5 J 21.0 J ND	В	800 300 400	702 162 326	2	77 47 82	825 309 412	794 175 339	86 50 82	12 8 4	40-140/25 40-140/25 40-140/25	
CAS No.	Surrogate Recoveries	MS		MSD		MC4	19242-4	Limits					
84-15-1	o-Terphenyl	85%		99%		61%		40-1409	6				

96%

48%

98%



<sup>\* =</sup> Outside of Control Limits.

### CHAIN OF CUSTODY

PAGE /	OF	2
--------	----	---

MΔ				M D'Angelo III. Bucidong One, Meriborough, MA 11752 TEL 508-481-5200 FAX: 508-481,7113																			
1417.7				IEL 3		ACCUMULA		7793					Aces	had Olive				Assu		ms	49	24	1
Client / Reporting Information	n isotoletta	Project Name:	STEM STORY	Project	t Inform	nation	Participa		APIG1	19976	وردده	36476	2 665	® Re	quested	Analys	la ( see					5650	Matrix Codes
Company Name		PTOJECT PERTIE:												Ι-					Т	T	T		
Anderson Mulholland & Associates			iroundwater Sa	mpling - Or	nzite W	elis							1	1	1 1				1		1		DW - Drinking Water OW - Ground Water
		Street			-		de la constant	34,411		1/10	42-04	100								1			WW - Water SW - Burtace Water
2700 Westchester Avenue, Suite 417 Cay Sum	Zea	City		State	Compa	informati my Name	on ( # diffe	broost fro	от Рер	ort to)			4							1		ĺ	\$0 - 501
Purchase NY	10577	Humacao		PR		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,											1						St. Studge SED-Sedment
Project Contact	E-med	Project #			Street	dores.			_				$\dashv$					ĺ		1			OI - OI LIQ - Other Liquid
Terry Taylor															ΙI					1	П		AR - Air SOL - Other Solid
Phone #	Fax ff	Chent Purchase	Order #		Cay			St	Ré		Zı	9	7						1	ì	H		WP - Wipe
914-251-0400 Sempler(s) Neme(s)	Phone 8	Prosed Manager	· · · · · · · · · · · · · · · · · · ·		Attende	411							4	1	H	- (				1			FB-Fleed Blank EB-Equipment Stans
		Terry Taylor												1	1 1				1	1	H		RB-Rnee Dienk TB-Trip Blank
	No. o			Coffeema		_			dynday (	d proces	ved Bo	F40	<b>- /</b> 뚲	¥	1								
[ <u></u> ]					Ī			Π.		l <sub>u</sub>	ti.	X	VMAVPHR	BWAEPHR							1 1		
Manage of Field ID / Point of Collection		AMEDINOUS P	Date	Time	Barrette	Mark	a of Latin	9 월	<u>                                   </u>	9	튑	18		2		- 1					ΙI		LAB USE ONLY
1 FB 121916			12-19-16	1332	RS	FR	5	5		П	$\top$	П	174	4		$\neg$		$\top$		1	Н		
2 MW-23			12-19-16	1532	NR	GIN	_	5	П	П	Т	П	×	1				1		$\vdash$		$\neg$	
3 MW-3			12-19-14	1607	R5	GW	3	5	$\vdash$	$\Box$	+	H	14	10		$\top$	+	$\dagger$		†—	H	$\dashv$	AD
47 MW-15			12-20-16	1/34	RS	GW	4-	4		П	十	П	Ý	文		$\neg$	$\top$	1	$\vdash$			$\dashv$	264
47 MW-15MS			12-20-16	1150	RS	SW	7	5	$\sqcap$	$\sqcap$	$\top$	П	文	攵		_	$\top$	1		$\vdash$		-	
MW-15-MSD	١		12-20-16	1205	RS	GW.	-2	5	$\sqcap$	П		$\sqcap$	17	Z	$\Box$	_ _	+	$\top$	1-		М	_	
3- MW-17			12-20-16	1205	NR	GW	75	3	П	П	$\top$	П	X	1							$\Box$	$\neg$	
5 MN-14			12-20-16	1411	RS	GW	5	5	П	П	$\top$	П	TX	X		$\neg \vdash$	$\neg$	INIT	AL A	SESS	MEN	ď	h
7 FR 122016			12-26-16	A50	R5	FB	5	5			$\top$		X	X		$\neg$		1.00			$\Box$		
3 EB122116			12-21-16	1017	NR	EB	5	<u>5</u>		П			14	X				10.00	L VE	RIFI	ATIO	<b>N</b> -	-
9 MW-18			12-20-16	1413	NR	GW	5	5	П	П	T		×	X		$\top$	T	$\Box$		$\Box$			
	==()					.,40	Hill	П		П	Т		86	3		3					12		
Tumeround Time ( Business days)		afetherary ar	COLUMN STREET	7.5	15390272				etolee kraf				Nime	-	outopus	-	Con	ments.	Зреска	d (natruc	tions 1	OF BUILDING	COME SEPTIME
X Std. 15 Business Days  Std. 10 Business Days ( by Contract o		Approved By (Asses	net PM): / Chole:				al "A" (La al "B" ( La					Cate											
18 Day MUSH							Level 344					onsa 'onsa	gory is										
a Day RUSH						U Reduce	d			5	E00 F	omst	-	_									
☐ 1 Day EMERGENCY ☐ 1 Day EMERGENCY						Communica					Other .	_	-										
1 Day EMERGENCY				- 1			Commercia Commercia					n.		ŀ					_				
Emergency & Rush T/A data available VIA Labor	NE .					1	U Reduce	d = Flee	ulta + O	C Sum	mary :	Partu	l Raw di	ita .									
Radingly day and the first of	Coto Tatry: 1	(CA)	role Custody mus leasted by:	t be docume	ented be	How each			hange het by:	-			uding c	ourler (		- Year	7120	-Acces	CORRE	(GWG-S	SEC THE	Critic	and an extension
1 IN INTIMOUN		16/20	Fed	EX			2			78	≫				De I	2-22-	k	2	** ?	10	2		
Restractional by Linguist.	Gate Tire:		lettime By: ]				. 4	a Brogulai	-			1	/		Des	a Tiera:		Resolve 4		10			
Retropolyhed by:	Date Tires:		omived By:				100	3 40	4/	<u>ال</u> يم	aa a	<u>e</u>	Intent Not mine	. '				_	4	On to	. 7 5	ester :	-5.8-3.45
<del></del>	·						<u> 78</u>	475	7/4/	4	97		Plot mino			<u> </u>				_ LE (	1/	-/	2 - 214 - 214 V

MC49242: Chain of Custody
Page 1 of 3

## CHAIN OF CUSTODY

MA			10 D'Angele Dr., Building Onc., Merhorough, MA 0 752					L	770014017627															
			TEL. 508-481-6200 FAX; 508-481-7753 Annual Chiese 9						MC 44 242															
Client / Reporting information	n kvargdal	1903000	SCTLLG/STMSTA	Projec	t Inform	_	History	Denou	1924	5365	i kara	1620	63	100 M	Ren	uested.	Anelysi	in I no	TEST	CODE		1.0	Message I	Matrix Codes
Company Name		Project Name:																1	1	7	1		-	
Anderson Mulholland & Associates		4th O 2015 0	Proundwater Sa	molies . C-	nalia ter	alle.															1		- 1	DW - Droking Wate
Street Address		Street	NOTIFICATED SE	mpang • Ui	HINTS AN	PK.S				energet in		- 1/1												QW - Ground Water WW - Weter
2700 Westchester Avenue, Sutte 417					Belline	informati	lon t al rivili	Efferent from Report to)													BW - Surface Water			
City State	Zia	Cay		State	Correpa	ny Name	Ott Car Chris	OF THE PLANT POPULATION				$\neg$								1			SC'- Sell SL-Sludge	
Purchase NY	10577	Humacao		PR													- 1	ı	-	1	1			SED-Sedment OI - OII
Project Contact	6-mail	Protect #			Street A	Aggress.							7								Į.		- 1	LIQ - Other Uguid
Terry Taylor Phone F	Fax 0												_	- [								[	ſ	AM - Ar SOL - Other Solid
	F 8.1 III	Cherk Purchase	Groet II		City			\$	1,010		- 7	Zip												WP - Wate FB-Fetti Blank
914-251-0400 Sempler(s) Hame(s)	Phone #	Prosect Manage			Azento								_				1						ŀ	E8-Equipment Blum
		Terry Taylor																	-				-	RB- Rinse Blank TB-Tro Blank
		remy raylor		Cadestion		_	1		Numbe	di pris			$\dashv$	뚲	뚲									- ar may specific
					T	1		П	TI	-1	bil	_ W	П	\$	9								1	
Field ID / Point of Collection		MECHOLVM P	Deb	Time	Sarrytan	Matri	d of bottom	2 3	ECO4	OF THE		ENCON	Ш	VMAVPHR	BIRAEPHR									LAB USE ONLY
10 BR-1			12-21-16	1254	- NK	SIV	5	15					1 1	M	X									
11 BR-1 Dill	?		12-21-16	1336	NR	GW	5	5	П	T		Т	14	×	X		$\top$			$\top$			7	
/d BR-2			12-21-16	1250		GW	5	1	++	+	H	+			1		~ -	+	+	+		-	-	
13 MW-1700	5	-		-					+	+	╀	- -	-			-	+	+		+	$\vdash$	$\rightarrow$	-	
100 1 - M 10 - 1 1 1001			12-20-16	1149	NR	GW	ےد	5	11	$\perp$	Ц	$\perp$	$\square$	$\Delta$	X.		$\perp$			_			_	
								$\square$	Ш		П	$\perp$	П	[					[ _					
									П	Т	П	Т	П	$\neg$				1		T	$\Box$	$\neg$	7	
								-	11	+	H		$\vdash$	$\dashv$	$\neg$	$\overline{}$	$\overline{}$	+	+	+			$\dashv$	
					-				₩	+	Н	+	$\vdash$	$\dashv$	$\rightarrow$		-	+	+	-		<del> </del> -		
					<u> </u>				44	-	Ц	$\perp$	Щ	4		$\rightarrow$		4_			$\square$			
						i			Ш															
									П	Ť	П			ヿ	一	T	T			Ī			-	
						Н	$\vdash$	+	╆	+	H	+	$\vdash$	+	-	+	+	+	+-	+	<del>  </del>	-+	-	
			-					- -	╂═┼	+	$\vdash$	+	+	+	-	-	- -		-	-		-	-	
2									П		Ш			1										
Turnaround Time ( Business days  [X] Std. 15 Business Days				4.4	1			Deliver	rable h				Fitte	Tayre.	100-247	HISTORY.	79/758	Co	monents	/ Specia	il Instruc	tions	15000	The state of the state of
Still 19 Business Days ( by Contract		Approved By [Asso.	ren rittle i Dillini	i			94"A" (La 94"B" ( La						tegory tegory											ł
10 Day HUSH	**						Level 3+4			_		ı Form			ŀ				_					
3 Dey MUSM						ii Heduo						Form			_ I									ł
1 Day EMERGENCY						-					Othe	-												
1 Day EMERGENCY			Transaction of the				Commercia								-									
1 Day EMERGENCY Emergency & Rush T/A data available VIA Lab	Note:						Commerci NJ Reduci						chal Da	an date	. 1									
and the fact that the same	100	Ser	nple Custody mu	nt be docum	ented be	low sect	time ser	nples	chang	e por	5000	ion, in	cludir	10 coi	urier d	pilvery.				les Combre	4 - 3 1000	-	122-3	Carrier of Carrier
DU XXIV	Date Time:	16/200	1 Fel	1 20	/			in language					9 >-				7.22	7/2	· Access	Hr.	ング	==		
1-/-				<u>/                                    </u>	160			2			- 1	Z	y /	_			_	/6	2	11 00			_	
Astropolist by Genelor:	Carin Thomas		Received By: 3	,			1	نيوطبة ذ	phod By	<b>j</b> 12						D <sub>effe</sub>	Thun:		Receiv	od By:				1
Refrequenced by:	Date Time:		Received By:				7	7.4	Bopt B	10.	for a	,,, [	) les	#		2007/00d W	have a pub	inghile.	12		Do lee		ealer Te	-
3	1		6				41	17 4	<b>24</b> .4	196.4	186 ·	MAG	7					-			0/-	7.13	-8	7210-551

MC49242: Chain of Custody

Page 2 of 3

#### **EXECUTIVE NARRATIVE**

SDG No:

MC49242

Laboratory:

**Accutest, Massachusetts** 

Analysis:

**MADEP VPH** 

Number of Samples:

15

Location:

BMSMC, Building 5 Area

Humacao, PR

**SUMMARY:** 

Fifth teen (15) samples were analyzed for Volatiles TPHC Ranges by method MADEP VPH. Samples were validated following the METHOD FOR THE DETERMINATION OF VOLATILE PETROLEUM HYDROCARBONS (VPH) quality control criteria, Massachusetts Department of Environmental Protection, Revision 1.1 (2004). Also the general validation guidelines promulgated by the USEPA Hazardous Wastes Support Section. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

Results are valid and can be used for decision making purposes.

**Critical issues:** 

None

Major:

None

Minor:

None

**Critical findings:** 

None

Major findings:

None

Minor findings:

- 1. Continuing and final calibration verification meets method specific requirements except in the cases described in this document. The % difference for VPH in the rt7/10 retention time window in the continuing and ending calibration verification was outside the method performance criteria. Results are qualified as estimated (j, UJ) in affected samples.
- 2. Target analytes detected in the method and field/equipment blanks at a concentration below the reporting limits. Laboratory qualified positive (concentration < 2 RL) results with a B qualifier, no additional qualification performed.
- **3.** MS/MSD % recovery and RPD outside laboratory control limits in sample MC49242-4 for C5-C8 Aliphatics (Unadj.). Results qualified as estimated (J) in affected sample.

COMMENTS:

Results are valid and can be used for decision making purposes.

Reviewers Name:

Rafael Infante

Chemist License 1888

Signature:

Date:

February 8, 2017

### SAMPLE ORGANIC DATA SAMPLE SUMMARY

Sample ID: MC49242-1

Sample location: BMSMC Building 5 Area

Sampling date: 12/19/2016

Matrix: AQ - Field Blank Water

### METHOD: MADEP VPH

Analyte Name	Result	Units Dil	ution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	U	Yes
Ç9 - C12 Aliphatics (Unadj.)	11.3	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	13.0	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	U	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	1.7	UJ 🗸 🔗	<b>↑</b> Yes

Sample ID: MC49242-2

Sample location: BMSMC Building 5 Area

Sampling date: 12/19/2016 Matrix: Groundwater

# METHOD: MADEP VPH

Analyte Name	Result	Units D	ilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	U	Yes
Ç9 - C12 Aliphatics (Unadj.)	10.5	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	13.7	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	U	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	UJ //	Yes

Sample ID: MC49242-3

Sample location: BMSMC Building 5 Area

Sampling date: 12/19/2016 Matrix: Groundwater

### METHOD: MADEP VPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	U	Yes
Ç9 - C12 Aliphatics (Unadj.)	63.9	ug/L	1	В	JB /	/ Yes
Ç9 - C10 Aromatics (Unadj.)	44.4	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	U	Yes
Ç9 - C12 Aliphatics	18.5	ug/L	1	J	J	Yes

Sample ID: MC49242-4

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016 Matrix: Groundwater

### METHOD: MADEP VPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	47.5	ug/L	1	J	J	y Yes
Ç9 - C12 Aliphatics (Unadj.)	154	ug/L	1	-	<u>□</u> √ /	Yes
Ç9 - C10 Aromatics (Unadj.)	90.0	ug/L	1	В	В	Yes
Ç5 - C8 Aliphatics	32.7	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	63.3	ug/L	1	_		Yes

Sample ID: MC49242-5

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016 Matrix: Groundwater

### METHOD: MADEP VPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	20.2	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	126	ug/L	1	В	JB /	Yes
Ç9 - C10 Aromatics (Unadj.)	66.9	ug/L	1	В	В	Yes
Ç5 - C8 Aliphatics	18.8	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	57.6	ug/L	1	-	/	Yes

Sample ID: MC49242-6

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016

Matrix: Groundwater

### METHOD: MADEP VPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	U	Yes
Ç9 - C12 Aliphatics (Unadj.)	12.4	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	15.1	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	U	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	UJ√	/ Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016

Matrix: AQ - Field Blank Water

# METHOD: MADEP VPH

Analyte Name	Result	Units D	ilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	U	Yes
Ç9 - C12 Aliphatics (Unadj.)	9.2	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	13.0	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	U ,	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	<u>(UJ)</u> √	Yes

Sample ID: MC49242-8

Sample location: BMSMC Building 5 Area

Sampling date: 12/21/2016

Matrix: AQ -Equipment Blank

Analyte Name	Result	Units (	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	U	Yes
Ç9 - C12 Aliphatics (Unadj.)	10.5	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	12.8	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	U	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	<u></u>	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016 Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units [	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	U	Yes
Ç9 - C12 Aliphatics (Unadj.)	12.1	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	12.0	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	•	U	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	UJ 🗸	Yes

Sample ID: MC49242-10

Sample location: BMSMC Building 5 Area

Sampling date: 12/21/2016 Matrix: Groundwater

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	32.8	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	34.0	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	20.1	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	23.2	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	13.9	ug/L	1	J	J	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/21/2016

Matrix: Groundwater

# METHOD: MADEP VPH

Analyte Name	Result	Units D	ilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	32.9	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	32.2	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	21.5	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	23.4	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	9.9	ug/L	1	J	J	Yes

Sample ID: MC49242-12

Sample location: BMSMC Building 5 Area

Sampling date: 12/21/2016

Matrix: Groundwater

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation R	eportable
Ç5 - C8 Aliphatics (Unadj.)	18.8	ug/L	1	J	J y	Yes
Ç9 - C12 Aliphatics (Unadj.)	104	ug/L	1	В	JB /	Yes
Ç9 - C10 Aromatics (Unadj.)	64.5	ug/L	1	В	В	Yes
Ç5 - C8 Aliphatics	16.6	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	38.5	ug/L	1	J	J	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016 Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units 0	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	18.4	ug/L	1	J	J ou	Yes
Ç9 - C12 Aliphatics (Unadj.)	130	ug/L	1	В	JB 🗸	Yes
Ç9 - C10 Aromatics (Unadj.)	69.7	ug/L	1	В	В	Yes
Ç5 - C8 Aliphatics	17.5	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	58.2	ug/L	1	-	/,	Yes

Sample ID: MC49242-4MS

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016 Matrix: Groundwater

Analyte Name	Result	Units D	ilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	467	ug/L	1	-	,	Yes
Ç9 - C12 Aliphatics (Unadj.)	662	ug/L	1	370	<b>□J</b>	Yes
Ç9 - C10 Aromatics (Unadj.)	206	ug/L	1	100	20	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016

Matrix: Groundwater

Analyte Name	Result	Units D	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	475	ug/L	1	-	- /	Yes
Ç9 - C12 Aliphatics (Unadj.)	653	ug/L	1	•		Yes
Ç9 - C10 Aromatics (Unadj.)	198	ug/L	1	-	-	Yes

# **DATA REVIEW WORKSHEETS**

Type of validation	Full:X Limited:	Project Number:_MC49242
REVIEW OF	VOLATILE PETROLEI	UM HYDROCARBON (VPHs) PACKAGE
actions. This documer informed decision and assessed according to METHOD FOR THE Dassachusetts Depart validation guidelines p	nt will assist the review in better serving the rethe data validation guida DETERMINATION OF Woment of Environmental promulgated by the USI ation actions listed on	organics were created to delineate required validation wer in using professional judgment to make more needs of the data users. The sample results were ance documents in the following order of precedence /OLATILE PETROLEUM HYDROCARBONS (VPH), Protection, Revision 1.1 (2004). Also the general EPA Hazardous Wastes Support Section. The QC the data review worksheets are from the primary
The hardcopied (lab received has been rev review for SVOCs inclu	iewed and the quality c	test_Laboratories data package ontrol and performance data summarized. The data
No. of Samples: Field blank No.: Equipment blank No.: _	MC49242-1;_MC492 MC49242-8	Sample matrix:Groundwater42-7
X Data CompletX Holding TimesN/A GC/MS TuningN/A Internal StandX BlanksX Surrogate ResX Matrix Spike/	s g ard Performance coveries	X Laboratory Control SpikesX Field DuplicatesX CalibrationsX Compound IdentificationsX Compound QuantitationX Quantitation Limits
Overall _Volatiles_by_GC_by_l	Method_MADEP_VPH,_	REV_1.1
Definition of Qualifiers:		
J- Estimated result U- Compound not R- Rejected data UJ- Estimated none  Reviewer: Reviewer: February	detected	

	Criteria were n	ot met and/or see below
. DATA COMPLETNE A. Data Packag		
MISSING INFORMATION	DATE LAB. CONTACTED	DATE RECEIVED
3. Other		Discrepancies:

All criteria were metX
Criteria were not met and/or see below

## **HOLDING TIMES**

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of extraction, and subsequently from the time of extraction to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	ACTION
			ample preservation
	1		
֡	SAMPLED	SAMPLED EXTRACTED  llyzed within method recommende	

## Criteria

### Preservation:

Samples analyzed with ambient purge temperature: Samples must be acidified to a pH of 2.0 or less at the time of collection.

Samples analyzed with heated purge temperature: Samples must be treated to a pH of 11.0 or greater at the time of collection.

Methanol preservation of soil/sediment samples is mandatory. Methanol (purgeand-trap grade) must be added to the sample vial before or immediately after sample collection. In lieu of the in-field preservation of samples with methanol, soil samples may be obtained in specially-designed air tight sampling devices, provided that the samples are extruded and preserved in methanol within 48 hours of collection.

## Holding times:

Aqueous samples using ambient or heated purge - analyze within 14 days. Soil/sediment samples - analysis within 28 days.

Cooler temperature (Criteria: 4	<u>+</u> 2 °C):	_5.8°C
---------------------------------	-----------------	--------

Actions: Qualify positive results/non-detects as follows:

If holding times are exceeded, estimate positive results (J) and nondetects (UJ).

If holding times are grossly exceeded, use professional judgment to qualify data. The data reviewer may choose to estimate positive results (J) and rejects nondetects (R).

If samples were not at the proper temperature (> 10°C) or improperly preserved, use professional judgment to qualify the results.

All criteria were met	_X
Criteria were not met and/or see below _	

#### CALIBRATIONS VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial cali	bration:	_10/31/16_	
Dates of initial ca	libration ve	erification:_	_10/31/16_
Instrument ID nu	mbers:	GCW	/X
Matrix/Level:	AQUEO	US/MEDIUI	М

DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, %D, r	SAMPLES AFFECTED
Initi	al and initial ca	libration verification	meet method specific r	equirements
			•	

### Criteria- ICAL

- Five point calibration curve.
- The percent relative standard deviation (%RSD) of the calibration factor must be equal to or less than 25% over the working range for the analyte of interest. When this condition is met, linearity through the origin may be assumed, and the average calibration factor is used in lieu of a calibration curve.
- A collective calibration factor must also be established for each hydrocarbon range
  of interest. Calculate the collective CFs for C5-C8 Aliphatic Hydrocarbons and C9C12 Aliphatic Hydrocarbons using the FID chromatogram. Calculate the collective
  CF for the C9-C10 Aromatic Hydrocarbons using the PID chromatogram. Tabulate
  the summation of the peak areas of all components in that fraction against the total
  concentration injected. The %RSD of the calibration factor must be equal to or less
  than 25% over the working range for the hydrocarbon range of interest.

## Criteria- CCAL

- At a minimum, the working calibration factor must be verified on each working day, after every 20 samples, and at the end of the analytical sequence by the injection of a mid-level continuing calibration standard to verify instrument performance and linearity.
- If the percent difference (%D) for any analyte varies from the predicted response by more than ±25%, a new five-point calibration must be performed for that analyte. Greater percent differences are permissible for n-nonane. If the %D for n-nonane is greater than 30, note the nonconformance in the case narrative. It should be noted that the %Ds are calculated when CFs are used for the initial calibration and

### **DATA REVIEW WORKSHEETS**

percent drifts are calculated when calibration curves using linear regression are used for the initial calibration.

### Actions:

If %RSD > 25% for target compounds or a correlation coefficient < 0.99, estimate positive results (J) and use professional judgment to qualify nondetects. If % D > 25% (> 30 for nonane), estimate positive results (J) and nondetects (UJ).

### CALIBRATIONS VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:	10/31/16
Dates of continuing calibration v	verification:12/27/16
Dates of final calibration verifica	ntion:_10/31/16;_12/28/16
Instrument ID numbers:	GCWX
Matrix/Level:AQU	JEOUS/MEDIUM

DATE	LAB FILE	ANALYTE	CRITERIA OUT	SAMPLES
	ID#		RFs, %RSD, <u>%D</u> , r	AFFECTED
12/27/16	cc3857-50	rt7/10	-39.3 %	MC49242-1 to ; -13;
12/28/16	cc3857-50	rt7/10	-46.0 %	-4MS/-4MSD

Note: Continuing and final calibration verification meets method specific requirements except in the cases described in this document. The % difference for VPH in the rt7/10 retention time window in the continuing and ending calibration verification was outside the method performance criteria. Results are qualified as estimated in affected samples.

A separate worksheet should be filled for each initial curve

12/27/16

Dittitute the transfer to	Onnonie				
			Criteria were not n	All criteria were met net and/or see belowX	_
V A. BLANK	ANALYSIS RE	SULTS (Sec	tions 1 & 2)		
of contamination associated with with any blanks determine whet problem is an	on problems. the samples, sexist, all dat her or not ther isolated occurrer samples su	The criteria including trip a associated re is an inherence not af	for evaluation of o, equipment, and d with the case manager erent variability in the fecting other data	the existence and magnitude blanks apply only to blank laboratory blanks. If problem ust be carefully evaluated the data for the case, or if the case and all all all all all all all all all al	ks to ne nk
List the contam separately.	ination in the	blanks belo	w. High and low I	evels blanks must be treate	:d
Laboratory blan	ks				
DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS	
_METHOD_BLA	ANKS_MEET_ CRIBED_IN_TH	THE_METHO	OD_SPECIFIC_CF	RITERIA_EXCEPT_IN_THE_	_
_12/27/16G	WX3888-MB_	_Aqueous/lo		ics_(Unadj.)14.8_ug/L atics_(Unadj.)15.3_ug/L	
			e results below ication performed.	the reporting limit with a	- В
Field/Trip/Equi	oment				
				hould continually accompar ely, during sampling, storage	
DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS	
_NO_TRIP_BLA	ANK_ASSOCIA	TED_WITH	_THIS_DATA_PAG	CKAGE	-
	TION_BELOW	_THE_REPO	DRTING_LIMITS_E	S_ANALYZED_AT_A EXCEPT_FOR_THE_CASES	-
_12/28/16	MC49242-1A	queous/low_	_C9-C10_Aliphatic	s_(Unadj.)11.3_ug/L	_

Aqueous/low\_C9-C10\_Aromatics\_(Unadj.)\_\_\_13.0\_ug/L

MC49242-7\_\_Aqueous/low\_C9-C10\_Aliphatics\_(Unadj.)\_\_\_\_9.2\_ug/L\_ \_\_\_Aqueous/low\_C9-C10\_Aromatics\_(Unadj.)\_\_\_13.0\_ug/L\_

ANALYZED	LAB ID	MATRIX	COMPOUND	UNITS	RATION
_12/28/16	_MC49242-8_	Aqueous/lo	w_ C9-C12_Aliph		
			C9-C10_Aro	matics_(Unadj.) 	12.8_ug/L
			- 135		

**Note:** No action taken, analytes not detected in samples above the reporting limit. Target analytes detected in method blank. Laboratory qualified positive results below the reporting limit with a B qualifier, no additional qualification performed.

# V B. BLANK ANALYSIS RESULTS (Section 3)

### Blank Actions

The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. Peaks must not be detected above the Reporting Limit within the retention time window of any analyte of interest. The hydrocarbon ranges must not be detected at a concentration greater than 10% of the most stringent MCP cleanup standard. Specific actions area as follows:

If the concentration is < sample quantitation limit (SQL) and < AL, report the compound as not detected (U) at the SQL.

If the concentration is  $\geq$  SQL but < AL, report the compound as not detected (U) at the reported concentration.

If the concentration is > AL, report the concentration unqualified.

SAMPLE ID

All criteria were met _	_X
Criteria were not met and/or see below	

ACTION

### SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.

List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery. Matrix: solid/aqueous

SURROGATE COMPOUND

2,3,4	- I rifluorotoluene	9		
_SURROGATE_STANDARD_RECOVERIES_WITHIN_LABORATORY_CONTROL LIMITS				
OC Limite* (Aguagua)				- Ga
QC Limits* (Aqueous)LL_to_UL QC Limits* (Solid)	_70_to_130_	to	to	
LL to UL	to	to	to	

It is recommended that surrogate standard recoveries be monitored and documented on a continuing basis. At a minimum, when surrogate recovery from a sample, blank, or QC sample is less than 70% or more than 130%, check calculations to locate possible errors, check the fortifying standard solution for degradation, and check changes in instrument performance.

If the cause cannot be determined, reanalyze the sample unless one of the following exceptions applies:

- (1) Obvious interference is present on the chromatogram (e.g., unresolved complex mixture);
- (2) Percent moisture of associated soil/sediment sample is >25% and surrogate recovery is >10%; or
- (3) The surrogate exhibits high recovery and associated target analytes or hydrocarbon ranges are not detected in sample.

If a sample with a surrogate recovery outside of the acceptable range is not reanalyzed based on any of these aforementioned exceptions, this information must be noted on the data report form and discussed in the Executive Report. Analysis of the sample on dilution may diminish matrix-related surrogate recovery problems. This approach can be used as long as the reporting limits to evaluate applicable MCP standards can still be achieved with the dilution. If not, reanalysis without dilution must be performed.

All criteria were met _	_X
Criteria were not met and/or see below	

## VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples.

At the request of the data user, and in consideration of sample matrices and data quality objectives, matrix spikes and matrix duplicates may be analyzed with every batch of 20 samples or less per matrix.

- Matrix duplicate Matrix duplicates are prepared by analyzing one sample in duplicate. The purpose of the matrix duplicates is to determine the homogeneity of the sample matrix as well as analytical precision. The RPD of detected results in the matrix duplicate samples must not exceed 50 when the results are greater than 5x the reporting limit.
- The desired spiking level is 50% of the highest calibration standard. However, the total concentration in the MS (including the MS and native concentration in the unspiked sample) should not exceed 75% of the highest calibration standard in order for a proper evaluation to be performed. The purpose of the matrix spike is to determine whether the sample matrix contributes bias to the analytical results. The corrected concentrations of each analyte within the matrix spiking solution must be within 70 130% of the true value. Lower recoveries of n-nonane are permissible (if included in the calibration of the C9-C12 aliphatic range), but must be noted in the narrative if <30%.</p>

MS/MSD Recoveries and Precision Criteria

Sample ID:\_MC49242-4\_MS/MSD\_\_\_\_\_ Matrix/Level:\_Groundwater\_\_\_\_

List the %Rs, RPD of the compounds which do not meet the QC criteria.

The QC reported here applies to the following samples: Method: MADEP VPH REV 1.1 MC49242-1, MC49242-2, MC49242-3, MC49242-4, MC49242-5, MC49242-6, MC49242-7, MC49242-8, MC49242-10, MC49242-11, MC49242-12, MC49242-13

	MC4924	2-4	Spike	MS	MS	Spike	MSD	MSD		Limits
Compound	ug/l	Q	ug/l	ug/l	%	ug/l	ug/l	%	RPD	Rec/RPD
C5-C8 Aliphatics (Unadj.)	47.5	j	300	467	140* a	300	475	143* a	2	70-130/25

<sup>(</sup>a) Outside control limits due to possible matrix interference.

**Note:** MS/MSD % recovery and RPD within laboratory control limits except for the cases described in this document. Results for C5- C8 Aliphatics (Unadj.) qualified as estimated (J or UJ) in sample MC49242-4.

<sup>\*</sup> Outside laboratory control limits.

### **DATA REVIEW WORKSHEETS**

No action is taken on MS/MSD results alone to qualify the entire case. However, used informed professional judgment, the data reviewer may use the MS/MSD results in conjunction with other QC criteria and determine the need for some qualification of the data. In those instances where it can be determined that the results of the MS/MSD affect only the sample spiked, the qualification should be limited to this sample alone. However, it may be determined through the MS/MSD results that the laboratory is having a systematic problem in the analysis of one or more analytes, which affects the associated samples.

## 2. MS/MSD – Unspiked Compounds

List the concentrations of the unspiked compounds and determine the % RSDs of these compounds in the unspiked sample, matrix spike, and matrix spike duplicate.

	CONCENTR				
COMPOUND	SAMPLE	MS	MSD	%RPD	ACTION

Criteria: None specified, use %RSD ≤ 50 as professional judgment.

## Actions:

If the % RSD > 50, qualify the results in the spiked sample as estimate (J). If the % RSD is not calculable (NC) due to nondetect value in the sample, MS, and/or MSD, use professional judgment to qualify sample data.

A separate worksheet should be used for each MS/MSD pair.

All criteria were metX
Criteria were not met and/or see below

# VIII. LABORATORY CONTROL SAMPLE (LCS/LCSD) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

List the %R of compounds which do not meet the criteria

LCS ID	COMPOUND	% R	QC LIMIT	ACTION	
LCS_RE	COVERY_WITHIN_L	ABORATORY	_CONTROL_LIM	TS	
				No. 11	

#### Criteria:

- Refer to QAPP for specific criteria.
- \* The spike recovery must be between 70% and 130%. Lower recoveries of n-nonane are permissible (if included in the calibration of the C9-C12 aliphatic range). If the recovery of n-nonane is <30%, note the nonconformance in the executive narrative.

### Actions:

Actions on LCS recovery should be based on both the number of compounds that are outside the %R criteria and the magnitude of the excedance of the criteria.

If the %R of the analyte is > UL, qualify all positive results (j) for the affected analyte in the associated samples and accept nondetects.

If the %R of the analyte is < LL, qualify all positive results (j) and reject (R) nondetects for the affected analyte in the associated samples.

If more than half the compounds in the LCS are not within the required recovery criteria, qualify all positive results as (J) and reject nondetects (R) for all target analyte(s) in the associated samples.

## 2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix (1 per 20 samples per matrix)? <u>Yes</u> or No.

If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected. Discuss the actions below:

	All criteria were metX Criteria were not met and/or see below
IX. FIELD/LABORATORY DUPLICATE	PRECISION
Sample IDs:MC49242-5/MC49242-13 Sample IDs:MC49242-10/MC49242-11_	
	taken and analyzed as an indication of overalleld and lab precision; therefore, the results may

have more variability than laboratory duplicates which measures only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

	CONC.	CONC.		ACTION
olicate anal	ent criteria ( <u>+</u> 50 %	6) for analytes detec	hin labora ted abov	atory and e reporting
	olicate ana	nce document criteria ( <u>+</u> 50 %	plicate analyzed with this data package. RPD with the detection of the det	olicate analyzed with this data package. RPD within laborate document criteria ( <u>+</u> 50 %) for analytes detected abovinits.

#### Criteria:

The project QAPP should be reviewed for project-specific information. RPD  $\pm$  30% for aqueous samples, RPD  $\pm$  50 % for solid samples if results are  $\geq$  SQL. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

SQL = soil quantitation limit

### Actions:

If both the sample and the duplicate results are nondetects (ND), the RPD is not calculable (NC). No action is needed.

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria.

If one sample result is not detected and the other is  $\geq 5x$  the SQL qualify (J/UJ).

**Note:** If SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is < 5x the SQL, use professional judgment to determine if qualification is appropriate.

All criteria were metX	
Criteria were not met and/or see below	

## XI. COMPOUND IDENTIFICATION

The compound identification evaluation is to verify that the laboratory correctly identified target analytes as well as tentatively identified compounds (TICs).

- 1. Verify that the target analytes were within the retention time windows.
  - Retention time windows must be re-established for each Target VPH Analyte each time a new GC column is installed, and must be verified and/or adjusted on a daily basis.
  - o Coelution of the m- and p- xylene isomers is permissible.
  - All surrogates must be adequately resolved from individual Target Analytes included in the VPH Component Standard.
  - For the purposes of this method, adequate resolution is assumed to be achieved if the height of the valley between two peaks is less than 25% of the average height of the two peaks.
  - The n-pentane (C5) and MtBE peaks must be adequately resolved from any solvent front that may be present on the FID and PID chromatograms, respectively.

**Note:** Target analytes were within the retention time window.

2. If target analytes and/or TICs were not correctly identified, request that the laboratory resubmit the corrected data.

		Crite	All crit eria were not met ar	teria were metX nd/or see below
XII.	QUANTITATIO	ON LIMITS AND SAMPLE R	ESULTS	
The sa	ample quantitatio	on evaluation is to verify lab	oratory quantitation	results.
1.	In the space be	elow, please show a minimu	m of one sample ca	lculation:
MC49	242-4	VPH (C9 – C	12 Aliphatics)	RF = 2.125 x 10 <sup>4</sup>
FID				
[]=(2	293785)/(2.125 x	: 10⁴)		
[]=1	3.83 ppb Ok			
MC49	242-4	VPH (C9 – C	:10 Aromatics)	$RF = 7.865 \times 10^3$
PID				
[]=(7	708075)/(7.865 x	: 10³)		
[]=9	0.02 ppb Ok			
2. (MDLs	•	erify that the results were al	pove the laboratory	method detection limit
3.		formed, were the SQLs ele mples and dilution factor in		by the laboratory? List
S	SAMPLE ID	DILUTION FACTOR	REASON FO	R DILUTION
		formed and the results were ted compounds. List the aff		
			<u> </u>	

#### **EXECUTIVE NARRATIVE**

SDG No:

MC49242

Laboratory:

**Accutest, Massachusetts** 

Analysis:

MADEP EPH

Number of Samples:

15

Location:

BMSMC, Building 5 Area

Humacao, PR

**SUMMARY:** 

Fifteen (15) samples were analyzed for Extractable TPHC Ranges by method MADEP EPH. Samples were validated following the METHOD FOR THE DETERMINATION OF EXTRACTABLE PETROLEUM HYDROCARBONS (EPH) quality control criteria, Massachusetts Department of Environmental Protection, Revision 1.1 (2004). Also the general validation guidelines promulgated by the USEPA Hazardous Wastes Support Section. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

Results are valid and can be used for decision making purposes.

**Critical issues:** 

None

Major:

None

Minor:

None

**Critical findings:** 

None

**Major findings:** 

None

Minor findings:

- 1. Target analytes detected in method, field and equipment blanks. No action taken analyte concentration was below reporting limits. Laboratory qualified positive results with concentration < 2 x MDL with a B qualifier; no further qualification made.
- 2. 1-Chlorooctadecane recovered outside laboratory control limits in samples MC49242-11 and -13. Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis. No action taken, professional judgment.
- 3. Field duplicate analyzed with this data package. RPD within laboratory and generally acceptable control limits except for the cases described in the Data Review Worksheet. No action taken, professional judgment.

**COMMENTS:** 

Results are valid and can be used for decision making purposes.

Reviewers Name:

Rafael Infante

Chemist License 1888

Signature:

Date:

abruant 9 2017

## SAMPLE ORGANIC DATA SAMPLE SUMMARY

Sample ID: MC49242-1

Sample location: BMSMC Building 5 Area

Sampling date: 12/19/2016

Matrix: AQ - Field Blank Water

# METHOD: MADEP EPH

Analyte Name	Result	Units D	ilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	38.3	ug/L	1	JB	JB	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	38.3	ug/L	1	JB	JB	Yes

Sample ID: MC49242-2

Sample location: BMSMC Building 5 Area

Sampling date: 12/19/2016 Matrix: Groundwater

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	45.4	ug/L	1	JB	JB	Yes
Ç9 - C18 Aliphatics	20.5	ug/L	1	J	J	Yes
Ç19 - C36 Aliphatics	37.0	ug/L	1	J	J	Yes
Ç11 - C22 Aromatics	45.4	ug/L	1	JB	JB	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/19/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	106	ug/L	1	В	В	Yes
Ç9 - C18 Aliphatics	21.7	ug/L	1	J	J	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	101	ug/L	1	В	В	Yes

Sample ID: MC49242-4

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	82.5	ug/L	1	JB	JB	Yes
Ç9 - C18 Aliphatics	21.0	ug/L	1	J	1	Yes
Ç19 - C36 Aliphatics	100	ug/L	1		U	Yes
Ç11 - C22 Aromatics	80.0	ug/L	1	JB	JB	Yes

Sample ID: MC49242-5

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units D	ilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	156	ug/L	1	В	В	Yes
Ç9 - C18 Aliphatics	68.6	ug/L	1	J	J	Yes
Ç19 - C36 Aliphatics	28.9	ug/L	1	J	Į	Yes
C11 - C22 Aromatics	156	ug/L	1	В	В	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units D	ilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	37.0	ug/L	1	JB	JB	Yes
Ç9 - C18 Aliphatics	17.7	ug/L	1	J	J	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	37.0	ug/L	1	JB	JB	Yes

Sample ID: MC49242-7

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016

Matrix: AQ - Field Blank Water

METHOD: MADEP EPH

Analyte Name	Result	Units D	ilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	41.6	ug/L	1	JB	JB	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	41.6	ug/L	1	JB	JB	Yes

Sample ID: MC49242-8

Sample location: BMSMC Building 5 Area

Sampling date: 12/21/2016

Matrix: AQ - Equipment Blank

Analyte Name	Result	Units [	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	39.4	ug/L	1	JB	JB	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	39.4	ug/L	1	JB	JB	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units D	ilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	48.6	ug/L	1	JB	JB	Yes
Ç9 - C18 Aliphatics	17.8	ug/L	1	J	J	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	48.6	ug/L	1	JB	JB	Yes

Sample ID: MC49242-10

Sample location: BMSMC Building 5 Area

Sampling date: 12/21/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units D	ilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	73.6	ug/L	1	JB	JB	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	73.6	ug/L	1	JB	JB	Yes

Sample ID: MC49242-11

Sample location: BMSMC Building 5 Area

Sampling date: 12/21/2016

Matrix: Groundwater

METHOD: MADEP EPH

Analyte Name	Result	Units Di	lution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	67.3	ug/L	1	JB	JB	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
C11 - C22 Aromatics	67.3	ug/L	. 1	JB	JB	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/21/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units [	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	95.9	ug/L	1	JB	JB	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	95.9	ug/L	1	JB	JB	Yes

Sample ID: MC49242-13

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016 Matrix: Groundwater METHOD: MADEP EPH

Analyte Name	Result	Units D	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	51.1	ug/L	1	JB	JB	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	= -	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	2	U	Yes
Ç11 - C22 Aromatics	51.1	ug/L	1	JB	JB	Yes

Sample ID: MC49242-4MS

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016 Matrix: Groundwater

Analyte Name	Result	Units E	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	702	ug/L	1	-	-	Yes
Ç9 - C18 Aliphatics	162	ug/L	1	-	-	Yes
Ç19 - C36 Aliphatics	326	ug/L	1	_	- 0	Yes

Sample location: BMSMC Building 5 Area

Sampling date: 12/20/2016 Matrix: Groundwater

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	794	ug/L	1	-	-	Yes
Ç9 - C18 Aliphatics	175	ug/L	1	-	-	Yes
Ç19 - C36 Aliphatics	339	ug/L	1	-	-	Yes

# **DATA REVIEW WORKSHEETS**

Type of validation	Full:X Limited:	Project Number:_MC49242
REVIEW OF EX	TRACTABLE PETROL	EPA Region: 2 PACKAGE  EUM HYDROCARBON (EPHs) PACKAGE
The following guideli validation actions. The more informed decisi were assessed accorprecedence METHO HYDROCARBONS (V (2004). Also the gen Support Section. The	ines for evaluating volating is document will assist the on and in better serving rding to the data validation FOR THE DETER! /PH), Massachusetts Deperal validation guidelines	ille organics were created to delineate required e reviewer in using professional judgment to make the needs of the data users. The sample results on guidance documents in the following order of MINATION OF EXTRACTABLE PETROLEUM partment of Environmental Protection, Revision 1.1 promulgated by the USEPA Hazardous Wastes dation actions listed on the data review worksheets
The hardcopied (lab received has been review for SVOCs incl	viewed and the quality co	st_Laboratories data package ntrol and performance data summarized. The data
No. of Samples: Field blank No.: Equipment blank No.:	15 MC49242-1;MC49242 _MC49242-8	Sample matrix:Groundwater 2-7;11;_MC49242-5/MC49242-13
X Blanks X Surrogate R	es ing ndard Performance	X Laboratory Control SpikesX Field DuplicatesX CalibrationsX Compound IdentificationsX Compound QuantitationX Quantitation Limits
Overall _Extractable_Petroleu	ım_Hydrocarbons_by_GC	Comments: C_by_Method_MADEP_EPH,_REV_1.1
Definition of Qualifiers	<b>5</b> ;	
J- Estimated res U- Compound no R- Rejected data UJ- Estimated nor	ot detected	
Reviewer:February_	<u> </u>	

	Criteria were not me	et and/or see below
. DATA COMPLETNE A. Data Packag		
MISSING INFORMATION	DATE LAB. CONTACTED	DATE RECEIVED
· -		<u> </u>
3. Other		Discrepancies:

All criteria were met \_\_x\_\_

All criteria were met	_X
Criteria were not met and/or see below	

## **HOLDING TIMES**

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of extraction, and subsequently from the time of extraction to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	ACTION
-				
Samples	extracted and ar	nalyzed within me	thad recommend	ed holding time
Gampioo	CALIGORIO GITA GI	lary 200 Within The	The recommend	ou notaling time

## Criteria

### Preservation:

Aqueous samples must be acidified to a pH of 2.0 or less at the time of collection.

Soil samples must be cooled at 4 ± 2 °C immediately after collection.

## Holding times:

Samples must be extracted within 14 days of collection, and analyzed within 40 days of extraction.

Cooler temperature (Criteria: 4 + 2 °C): 5.8°C	
--	--

Actions: Qualify positive results/nondetects as follows:

If holding times are exceeded, estimate positive results (J) and nondetects (UJ). If holding times are grossly exceeded, use professional judgment to qualify data. The data reviewer may choose to estimate positive results (J) and rejects nondetects (R). If samples were not at the proper temperature (> 10°C) or improperly preserved, use professional judgment to qualify the results.

All criteria were metX Criteria were not met and/or see below							
CALIBRAT	CALIBRATIONS VERIFICATION						
ensure that	Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.						
Dat	e of initial calib	ration:12/06	5/16				
Dates of initial calibration verification:12/06/16							
Inst	rument ID num	bers:GCD	E				
Matrix/Level:AQUEOUS/MEDIUM							
DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, %D, r	SAMPLES AFFECTED			
Initial and continuing calibration meet method specific requirements							

### Criteria- ICAL

- Five point calibration curve.
- The percent relative standard deviation (%RSD) of the calibration factor must be
  equal to or less than 25% over the working range for the analyte of interest.
  When this condition is met, linearity through the origin may be assumed, and the
  average calibration factor is used in lieu of a calibration curve.
- A collective calibration factor must also be established for each hydrocarbon range of interest. Calculate the collective CFs for C9-C18 Aliphatic Hydrocarbons, C19-C36 Aliphatic Hydrocarbons, and C11-C22 Aromatic Hydrocarbons using the FID chromatogram. Tabulate the summation of the peak areas of all components in that fraction against the total concentration injected. The %RSD of the calibration factor must be equal to or less than 25% over the working range for the hydrocarbon range of interest.
  - o The area for the surrogates must be subtracted from the area summation of the range in which they elute.
  - o The areas associated with naphthalene and 2-methylnaphthalene in the aliphatic range standard must be subtracted from the uncorrected collective C9-C18 Aliphatic Hydrocarbon range area prior to calculating the CF.

### Criteria- CCAL

 At a minimum, the working calibration factor must be verified on each working day, after every 20 samples or every 24 hours (whichever is more frequent), and

### **DATA REVIEW WORKSHEETS**

- at the end of the analytical sequence by the injection of a mid-level continuing calibration standard to verify instrument performance and linearity.
- If the percent difference (%D) for any analyte varies from the predicted response by more than ±25%, a new five-point calibration must be performed for that analyte. Greater percent differences are permissible for n-nonane. If the %D for n-nonane is greater than 30, note the nonconformance in the case narrative. It should be noted that the %Ds are calculated when CFs are used for the initial calibration and percent drifts are calculated when calibration curves using linear regression are used for the initial calibration.

### Actions:

If %RSD > 25% for target compounds or a correlation coefficient < 0.99, estimate positive results (J) and use professional judgment to qualify nondetects. If % D > 25% (> 30 for nonane), estimate positive results (J) and nondetects (UJ).

## **CALIBRATIONS VERIFICATION**

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:12/06/16
Dates of continuing calibration verification:01/04/17;_01/05/17
Dates of final calibration verification:_12/06/16;_01/04/17;_01/05/17
Instrument ID numbers:GCDE
Matrix/Level:_SOIL/AQUEOUS/MEDIUM

DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, %D, r	SAMPLES AFFECTED
li li	 nitial and contir	uing calibration meets	method specific req	uirements.
			,	

#### Note:

A separate worksheet should be filled for each initial curve

				All criteria wer	e met
		Cri	iteria were not m	et and/or see be	elowX
V A. BLANK	ANALYSIS RE	SULTS (Sec	tions 1 & 2)		
magnitude of collanks associated by the collams with evaluated to decase, or if the Method Blank	ontamination proted with the same any blanks expetermine whethe problem is an i	roblems. The mples, including ist, all data er or not the solated occupiter samples	results is to de criteria for evaluating trip, equipments associated with re is an inherent arrence not affects suspected of but.	uation of blanks ent, and labora the case must variability in the ting other data.	apply only to tory blanks. If t be carefully e data for the A Laboratory
List the contam separately.	nination in the b	olanks below	. High and low le	evels blanks mu	ust be treated
Laboratory blar	nks				
DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCE UNITS	ENTRATION
			DD_SPECIFIC_C CUMENT		
_01/04/17C	P49338-MB/	Aqueous/low	C11-C22_Aron C11-C22_Aron	matics_(Unadj.) matics_	
(		e results with	ncentration below h concentration of		
Field/Trip/Equi	pment				
DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCE UNITS	ENTRATION
_ANALYZED_F	OR_THIS_DA	TA_PACKAG	IN_THE_FIELD/I GE_EXCEPT_FO	R_THE_CASES	
_01/04/17	MC49242-1_	Aqueous/low	/_C11-C22_Aron C11-C22_Aror	natics_(Unadj.)_ natics	
			/_C11-C22_Aron C11-C22_Aror	natics_(Unadj.)_ natics_	41.6_ug/l_ 41.6_ug/l_
	MC49242-8_	Aqueous/low	C11-C22_Aron/ C11-C22_Aror/	natics_(Unadj.)_ natics_	

	All criteria were met>	<b>\</b>
Criteria were	not met and/or see below	

**Note:** No action taken, analyte concentration below the reporting limit. The laboratory qualified the results with a B qualifier. No further qualification made.

# V B. BLANK ANALYSIS RESULTS (Section 3)

#### **Blank Actions**

The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. Peaks must not be detected above the Reporting Limit within the retention time window of any analyte of interest. The hydrocarbon ranges must not be detected at a concentration greater than 10% of the most stringent MCP cleanup standard. Specific actions area as follows:

If the concentration is < sample quantitation limit (SQL) and < AL, report the compound as not detected (U) at the SQL.

If the concentration is  $\geq$  SQL but < AL, report the compound as not detected (U) at the reported concentration.

If the concentration is > AL, report the concentration unqualified.

All criteria were m	et
Criteria were not met and/or see below	/ X

### SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.

List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery. Matrix: solid/aqueous

SAMPLE ID SURROGATE COMPOUND S1 S2 S3 S4

\_SURROGATE\_STANDARDS\_RECOVERIES\_WITHIN\_LABORATORY\_CONTROL\_\_
\_LIMITS\_EXCEPT\_FOR\_THE\_CASES\_DESCRIBED\_IN\_THIS\_DOCUMENT.\_\_\_\_

Note: 1-Chlorooctadecane recovered outside laboratory control limits in samples MC49242-11 and -13. Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.

It is recommended that surrogate standard recoveries be monitored and documented on a continuing basis. At a minimum, when surrogate recovery from a sample, blank, or QC sample is less than 40% or more than 140%, check calculations to locate possible errors, check the fortifying standard solution for degradation, and check changes in instrument performance.

If the cause cannot be determined, reanalyze the sample unless one of the following exceptions applies:

- (1) Obvious interference is present on the chromatogram (e.g., unresolved complex mixture):
- (2) The surrogate exhibits high recovery and associated target analytes or hydrocarbon ranges are not detected in sample.

If a sample with a surrogate recovery outside of the acceptable range is not reanalyzed based on any of these aforementioned exceptions, this information must be noted on the data report form and discussed in the Executive Report. Analysis of the sample on dilution may diminish matrix-related surrogate recovery problems. This approach can be used as long as the reporting limits to evaluate applicable MCP standards can still be achieved with the dilution. If not, reanalysis without dilution must be performed.

All criteria were met _X
Criteria were not met and/or see below

## VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples.

At the request of the data user, and in consideration of sample matrices and data quality objectives, matrix spikes and matrix duplicates may be analyzed with every batch of 20 samples or less per matrix.

- Matrix duplicate Matrix duplicates are prepared by analyzing one sample in duplicate. The purpose of the matrix duplicates is to determine the homogeneity of the sample matrix as well as analytical precision. The RPD of detected results in the matrix duplicate samples must not exceed 50 when the results are greater than 5x the reporting limit.
- The desired spiking level is 50% of the highest calibration standard. However, the total concentration in the MS (including the MS and native concentration in the unspiked sample) should not exceed 75% of the highest calibration standard in order for a proper evaluation to be performed. The purpose of the matrix spike is to determine whether the sample matrix contributes bias to the analytical results. The corrected concentrations of each analyte within the matrix spiking solution must be within 40 140% of the true value. Lower recoveries of n-nonane are permissible but must be noted in the narrative if <30%.</p>

MS/MSD Recov	eries and Precision Crite	eria			
Sample ID:_MC49242-4_MS/MSD			Matrix/Level:Groundwater		
List the %Rs, Ri	PD of the compounds wh	nich do not	meet t	he QC criteria.	
MS OR MSD	COMPOUND	% R	RPD	QC LIMITS	ACTION
£					
V2					
· · · · · · · · · · · · · · · · · · ·					

**Note:** MS/MSD and RPD within laboratory control limits.

All criteria were metX
Criteria were not met and/or see below

No action is taken on MS/MSD results alone to qualify the entire case. However, used informed professional judgment, the data reviewer may use the MS/MSD results in conjunction with other QC criteria and determine the need for some qualification of the data. In those instances where it can be determined that the results of the MS/MSD affect only the sample spiked, the qualification should be limited to this sample alone. However, it may be determined through the MS/MSD results that the laboratory is having a systematic problem in the analysis of one or more analytes, which affects the associated samples.

## 2. MS/MSD - Unspiked Compounds

List the concentrations of the unspiked compounds and determine the % RSDs of these compounds in the unspiked sample, matrix spike, and matrix spike duplicate.

COMPOUND	CONCENTRA SAMPLE	ATION MS	MSD	%RPD	ACTION
	0.32-52				
	e <sup>2</sup> 1				

Criteria: None specified, use %RSD ≤ 50 as professional judgment.

### Actions:

If the % RSD > 50, qualify the results in the spiked sample as estimate (J). If the % RSD is not calculable (NC) due to nondetect value in the sample, MS, and/or MSD, use professional judgment to qualify sample data.

A separate worksheet should be used for each MS/MSD pair.

	Criteria were not met and/or see below
VIII	. LABORATORY CONTROL SAMPLE (LCS/LCSD) ANALYSIS
Thi matrices.	s data is generated to determine accuracy of the analytical method for various
1.	LCS Recoveries Criteria
	List the %R of compounds which do not meet the criteria
LCS ID	COMPOUND % R QC LIMIT ACTION
_LCS/LCS	D_RECOVERY_WITHIN_LABORATORY_CONTROL_LIMTS
No	te:
<b>Cr</b> i * *	Refer to QAPP for specific criteria.  The spike recovery must be between 40% and 140%. Lower recoveries of n-nonane are permissible. If the recovery of n-nonane is <30%, note the nonconformance in the executive narrative. RPD between LCS/LCSD must be < 25%.
Act tha	ions: ions on LCS recovery should be based on both the number of compounds t are outside the %R and RPD criteria and the magnitude of the excedance of criteria.
the associ If the %R for the affe If more tha	of the analyte is > UL, qualify all positive results (j) for the affected analyte in ated samples and accept nondetects.  of the analyte is < LL, qualify all positive results (j) and reject (R) nondetects acted analyte in the associated samples.  In half the compounds in the LCS are not within the required recovery criteria, positive results as (J) and reject nondetects (R) for all target analyte(s) in the I samples.
2. Fre	quency Criteria:
per matrix If no, the the effect	S analyzed at the required frequency and for each matrix (1 per 20 samples 1? Yes or No. data may be affected. Use professional judgment to determine the severity of and qualify data accordingly. Discuss any actions below and list the samples discuss the actions below:

			All crite	eria were met
		Criteria were not	met and/or	r see belowX
IX.	FIELD/LABORATORY DUPLICA	TE PRECISION		
Sample	e IDs:MC49242-5/MC49242-	13	Matrix:	_Groundwater

Field/laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which measures only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

COMPOUND	SQL	SAMPLE	DUPLICATE	RPD	ACTION
		CONC.	CONC.		
C11-C22 Aromatics	110	156	51.1	101	No action
(Unadj.)					
C9-C18 Aliphatics	110	68.6	ND	_	
C19-C36 Aliphatics	110	28.9	ND	-	
C11-C22 Aromatics	110	156	51.1	101	

Field duplicate analyzed with this data package. RPD within laboratory and generally acceptable control limits except for the cases described in this document. No action taken, professional judgment.

## Criteria:

The project QAPP should be reviewed for project-specific information. RPD  $\pm$  30% for aqueous samples, RPD  $\pm$  50 % for solid samples if results are  $\geq$  SQL. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

SQL = soil quantitation limit

#### Actions:

If both the sample and the duplicate results are nondetects (ND), the RPD is not calculable (NC). No action is needed.

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria.

If one sample result is not detected and the other is > 5x the SQL qualify (J/UJ).

**Note:** If SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is < 5x the SQL, use professional judgment to determine if qualification is appropriate.

		Crite	All criteria eria were not met and		netN/A below	
IX. FIELD/LABORATORY DUPLICATE PRECISION						
Sample IDs:MC	Sample IDs:MC49242-10/MC49242-11					
Field/laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which measures only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.						
COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION	
Field duplicate ana	lyzed with	this data packa acceptable con	 ge. RPD within labora trol limits.	atory an	d generally	
		100				
Criteria:  The project QAPP should be reviewed for project-specific information.  RPD ± 30% for aqueous samples, RPD ± 50 % for solid samples if results are ≥ SQL.  If both samples and duplicate are <5 SQL, the RPD criteria is doubled.						
SQL = soil quantitation limit						
Actions:						
If both the sample and the duplicate results are nondetects (ND), the RPD is not calculable (NC). No action is needed.						
Qualify as estimated exceeded the above		results (J) and	nondetects (UJ) for	the co	ompound that	
If one sample result is not detected and the other is $\geq 5x$ the SQL qualify (J/UJ).						

Note: If SQLs for the sample and duplicate are significantly different, use professional

If one sample value is not detected and the other is < 5x the SQL, use professional

judgment to determine if qualification is appropriate.

judgment to determine if qualification is appropriate.

All criteria were met _	_X
Criteria were not met and/or see below	

## XI. COMPOUND IDENTIFICATION

The compound identification evaluation is to verify that the laboratory correctly identified target analytes as well as tentatively identified compounds (TICs).

- 1. Verify that the target analytes were within the retention time windows.
  - Retention time windows must be re-established for each Target EPH Analyte each time a new GC column is installed, and must be verified and/or adjusted on a daily basis.
  - The n-nonane (n-C9) peak must be adequately resolved from the solvent front of the chromatographic run.
  - All surrogates must be adequately resolved from the Aliphatic Hydrocarbon and Aromatic Hydrocarbon standards.
  - For the purposes of this method, adequate resolution is assumed to be achieved if the height of the valley between two peaks is less than 25% of the average height of the two peaks.
  - The n-pentane (C5) and MtBE peaks must be adequately resolved from any solvent front that may be present on the FID and PID chromatograms, respectively.
- 1a. Aliphatic hydrocarbons range:
  - o Determine the total area count for all peaks eluting 0.1 minutes before the retention time (Rt) for n-C9 and 0.01 minutes before the Rt for n-C19.
  - Determine the total area count for all peaks eluting 0.01 minutes before the Rt for n-C19 and 0.1 minutes after the Rt for n-C36.

Are the aliphatic hydrocarbons range properly determined?

Yes? or No?

Comments:

- 1b. Aromatic hydrocarbons range:
  - Determine the total area count for all peaks eluting 0.1 minutes before the retention time (Rt) for naphthalene and 0.1 minutes after the Rt for benzo(g,h,i)perylene.
  - Determine the peak area count for the sample surrogate (OTP) and fractionation surrogate(s). Subtract these values from the collective area count value.

Are the aliphatic hydrocarbons range properly determined?

Yes? or No?

Comments:

All criteria were met _	_X
Criteria were not met and/or see below	

- 2. If target analytes and/or TICs were not correctly identified, request that the laboratory resubmit the corrected data.
- 3. Breakthrough determination Each sample (field and QC sample) must be evaluated for potential breakthrough on a sample specific basis by evaluating the % recovery of the fractionation surrogate (2-bromonaphthalene) and on a batch basis by quantifying naphthalene and 2-methylnaphthalene in both the aliphatic and aromatic fractions of the LCS and LCSD. If either the concentration of naphthalene or 2-methylnaphthalene in the aliphatic fraction exceeds 5% of the total concentration for naphthalene or 2-methylnaphthalene in the LCS or LCSD, fractionation must be repeated on all archived batch extracts.

NOTE:

The total concentration of naphthalene or 2-methylnaphthalene in the LCS/LCSD pair includes the summation of the concentration detected in the aliphatic fraction and the concentration detected in the aromatic fraction.

Comments:Concentration_in_the_aliphatic_fraction_<_5%_of_the_total	-
_concentration_for_naphthalene_and_2-methylnaphthalene	_
<u>.</u>	-
	-

4. **Fractionation Check Standard** – A fractionation check solution is prepared containing 14 alkanes and 17 PAHs at a nominal concentration of 200 ng/µl of each constituent. The Fractionation Check Solution must be used to evaluate the fractionation efficiency of each new lot of silica gel/cartridges, and establish the optimum hexane volume required to efficiently elute aliphatic hydrocarbons while not allowing significant aromatic hydrocarbon breakthrough. For each analyte contained in the fractionation check solution, excluding n-nonane, the Percent Recovery must be between 40 and 140%. A 30% Recovery is acceptable for n-nonane.

Is a fractionation check standard analyzed?

Yes? or No?

Comments: Not applicable.

All criteria were met \_\_X\_\_\_
Criteria were not met and/or see below \_\_\_\_\_

## XII. QUANTITATION LIMITS AND SAMPLE RESULTS

The sample quantitation evaluation is to verify laboratory quantitation results.

In order to demonstrate the absence of aliphatic mass discrimination, the response ratio of C28 to C20 must be at least 0.85. If <0.85, this nonconformance must be noted in the laboratory case narrative.

The chromatograms of Continuing Calibration Standards for aromatics must be reviewed to ensure that there are no obvious signs of mass discrimination.

Is aliphatic mass discrimination observed in the sample?

Yes? or No?

Is aromatic mass discrimination observed in the sample?

Yes? or No?

1. In the space below, please show a minimum of one sample calculation:

MC49242-2

EPH (C11 – C22, Aromatics)

RF = 99940

[] = (2111647)/(99940)

[] = 21.13 ppb Ok

EPH (C19 - C36, Aliphatics)

RF = 67800

[] = (1165732)/(67800)

[] = 17.19 ppb Ok

# **DATA REVIEW WORKSHEETS**

- 2. If requested, verify that the results were above the laboratory method detection limit (MDLs).
- 3. If dilutions performed, were the SQLs elevated accordingly by the laboratory? List the affected samples and dilution factor in the table below.

SAMPLE ID	DILUTION FACTOR	REASON FOR DILUTION
	_l	
-		-
<u> </u>		
<u> </u>		
		7,197

If dilution was not performed, affected samples/compounds:	s (J) for the	affected	compounds.	List th	ne
	 - 324	4			